performed. The DEP is usually close to the midway seat position for the 50 percentile person. The correct seat position to place the evaluator's eye at the DEP can be approximated by placing the seat at the center of the range of adjustment and finding the evaluator's anthropometric sitting eye height and the 50 percentile sitting eye height from the anthropometric data tables. The two can then be subtracted and for the taller person the seat can be moved down by the difference to drop the evaluator's eye to the correct position. For the shorter person the seat is raised by the difference. While wearing a standard flight helmet, the head is placed against the head rest. The evaluator's reach is defined while the head is placed at this point.

Controls and displays should be evaluated while seated at the DEP and wearing normal flight clothing. A complete set of anthropometric data should be collected on each evaluator and the measurements documented in all reported test results. A deficiency with control reach is meaningless when the cockpit was designed for a reach range that does not include the evaluator. The clothing and personal flight equipment worn should also be documented.

A good discussion of the specifics of human factors standards applied to radar displays and controls can be found in references 13 and 14.

2.1.11. The Sample Radar System

The sample radar used to illustrate the development of the basic radar test techniques is a multimode air-to-air and air-to-ground radar installed on a modern fighter/attack airplane. The air-to-ground radar modes include real beam map as well as DBS modes. Geostable cursors with digital displays are available. The air-to-air radar modes include pulse compressed, VS and FM ranging. The radar will operate in either search or TWS air-to-air modes.

2.2. AIR-TO-AIR AND AIR-TO-GROUND RADAR TEST TECHNIQUES

2.2.1. Preflight and Built-in-Tests

2.2.1.1. Purpose

The purpose of this test is to assess the suitability of the radar preflight and turn on procedure and the Built-In-Test (BIT) to quickly and easily bring the radar on line and insure an operational or "up" system, once airborne.

2.2.1.2. General

As airplanes become more expensive, fewer and fewer will be available to accomplish each mission, amplifying the loss of individual airplanes to inflight failures. Quick, accurate ground preflight tests are essential to determine system status while repairs can still be performed. A quick response/alert time is also important and so these checks must be expeditious and must allow the operator to prepare for the mission with a minimum of distractions. Limited airplane availability also implies the need for quick turn-arounds to send the same aircraft out for successive missions. This necessitates a very short preflight and turn on procedure that can be accomplished safely and thoroughly before a hurried combat mission.

2.2.1.3. Instrumentation

A stop watch and data cards are required for this test. A voice tape recorder is optional.

2.2.1.4. Data Required

Qualitative comments, time to complete the preflight/turn on and time to complete the BIT is required. A record of BIT indications are required.

2.2.1.5. Procedure

Perform a normal system turn on before each test flight using the published system check list. Note the times for radar time out and the total system preflight time up to the ready for operate indications. Perform a preflight BIT, noting the total BIT time and indications. Note any correlation between the BIT indications and the radar's operation. Perform a complete system check out of the failure indications. Make qualitative comments as appropriate.

2.2.1.6. Data Analysis and Presentation

The time and complexity of the preflight procedures listed in the operator's checklist and radar turn on/timeout procedure should be related to the expected alert launch time requirements and the overall operator workload during the alert launch. The BIT times and the amount of operator interface required to perform the BIT should be assessed in the same scenario. Clarity of the BIT indications should be related to the cockpit environment. The BIT indications should be related to actual radar degradation and verified by ground technicians. Erroneous BIT false alarms should be noted and related to the probability of unnecessarily missed sorties.

2.2.1.7. Data Cards

Sample data cards are presented as cards 1 and 2.

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CARD NUMBER ____

PREFLIGHT/TURN ON

CLARITY OF CHECKLIST INSTRUCTIONS:

LOGICAL SEQUENCE OF CHECKLIST:

THOROUGHNESS OF CHECKLIST:

SYSTEM STATUS/RADAR TIMEOUT COMPLETE INDICATIONS:

RADAR TIMEOUT TIME_____

TOTAL PREFLIGHT TIME INCLUDING TIMEOUT_____

Card 1: Preflight/Turn On Data Card

CARD NUMBER ____

BUILT IN TESTS

INITIATION PROCEDURES:

RUN/FINISH INDICATIONS:

BIT FAILURES AND QUALITATIVE FUNCTIONAL ASSESSMENT OF RADAR/RESULTS OF GROUND MAINTENANCE CHECKS:

Card 2: Built In Tests Data Card